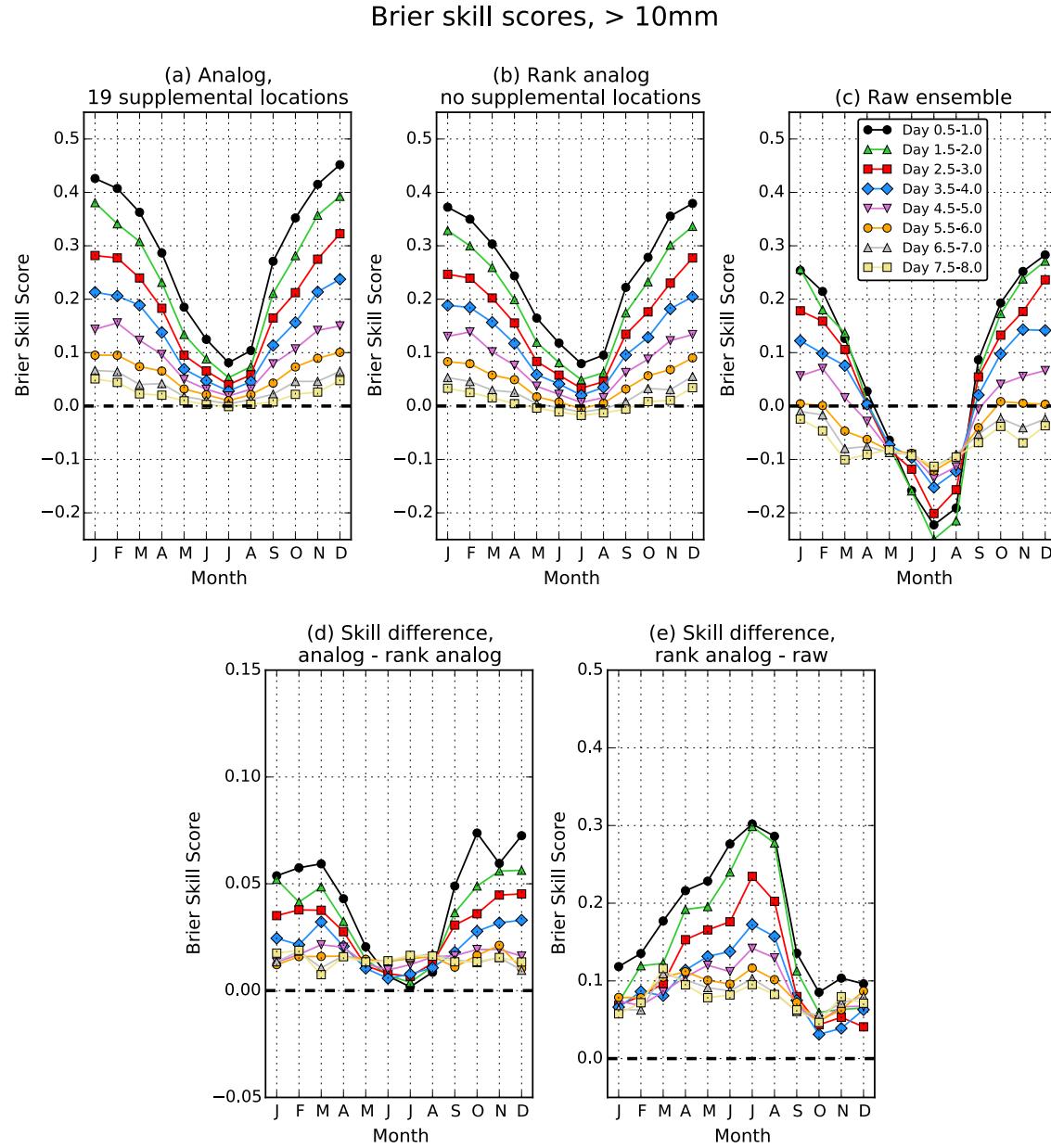


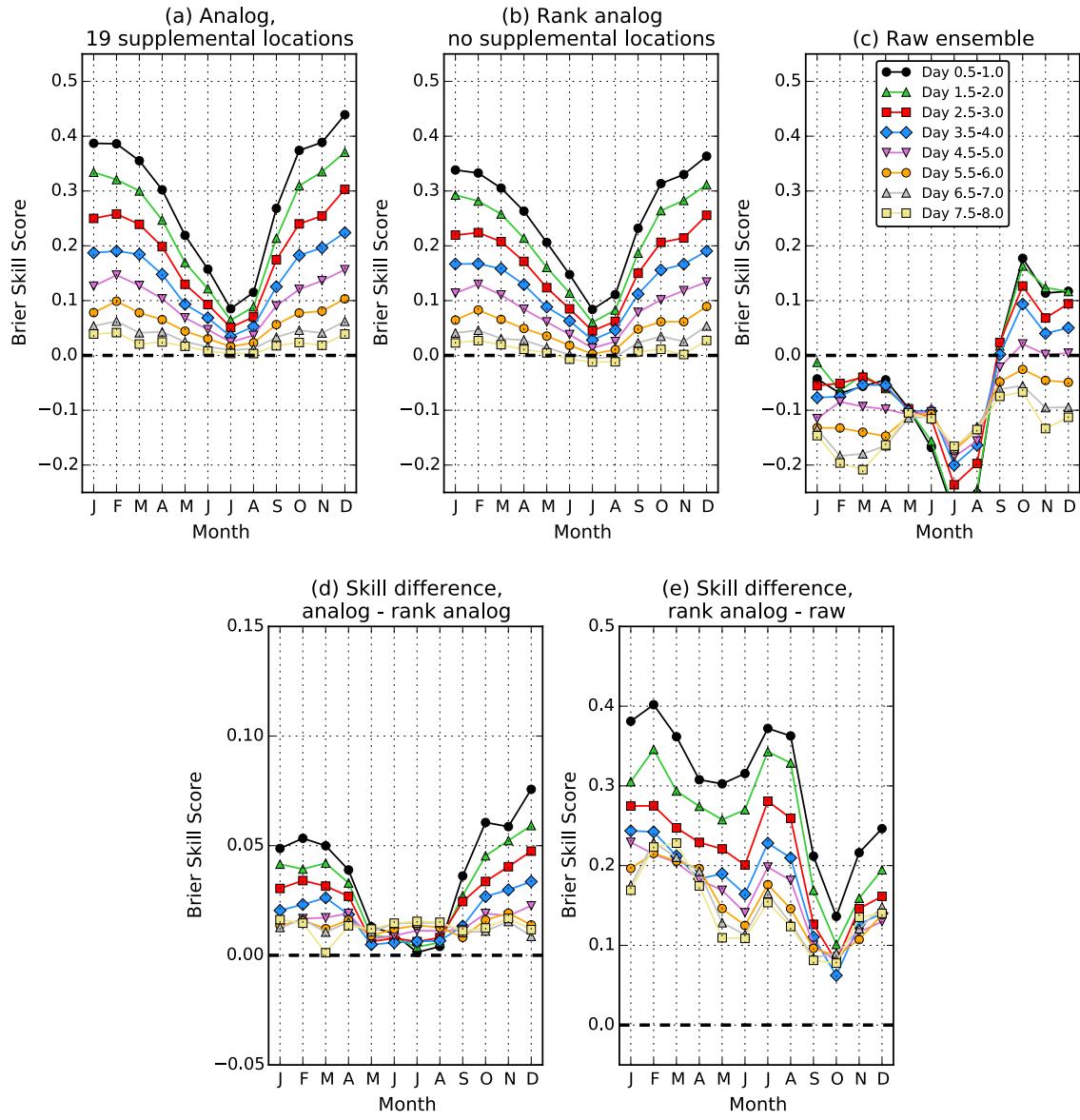
## Online Appendix B: Extra Verification Data

This appendix contains verification data not included in the expedited contribution article.



**Figure B1.** As in Fig. 2 from the article, but for the  $> 10 \text{ mm } 12 \text{ h}^{-1}$  event threshold.

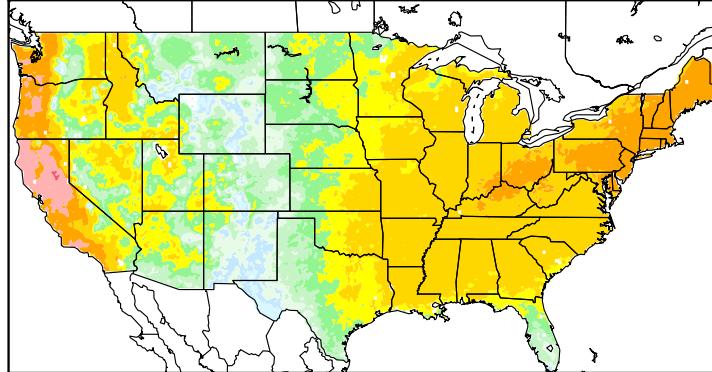
### Brier skill scores, $> q95$



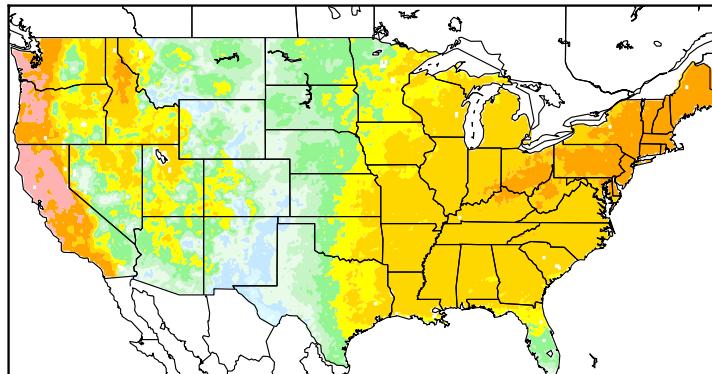
**Figure B2.** As in Fig. 2 from the article, but for the event of exceeding the 95<sup>th</sup> percentile of the climatological distribution (which is calculated individually for each month and each grid point).

Brier Skill Scores for 012 to 024-h forecasts, > 1mm event

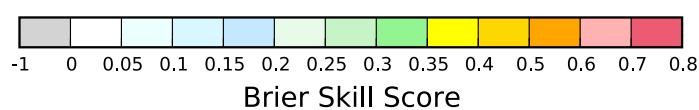
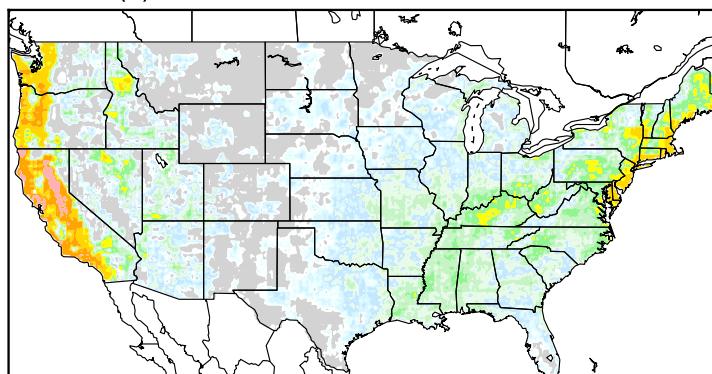
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



(c) Raw 11-member ensemble forecast

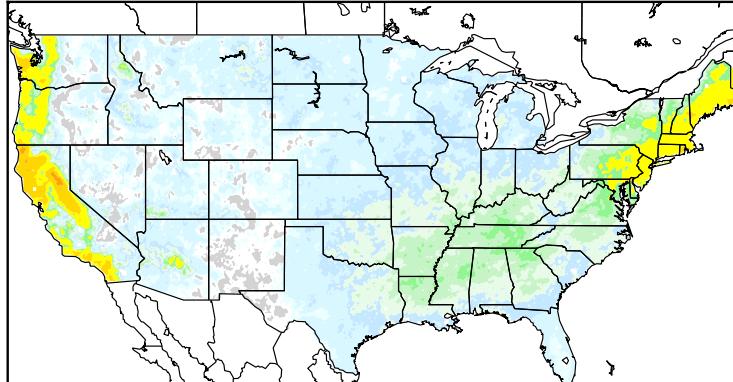


**Figure B3:** As in Fig. 4 from the article, but for 12-24 h forecasts of the > 1 mm

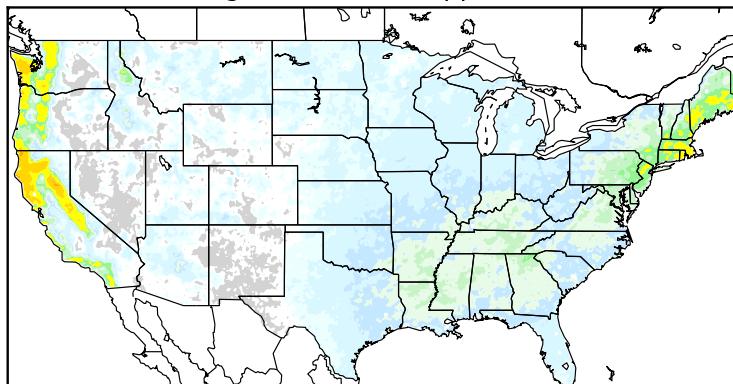
event.

Brier Skill Scores for 012 to 024-h forecasts, > 10mm event

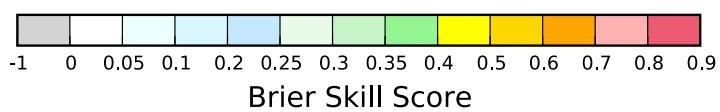
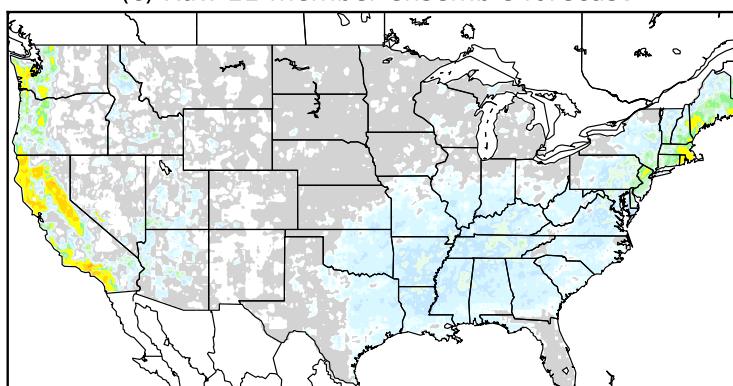
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



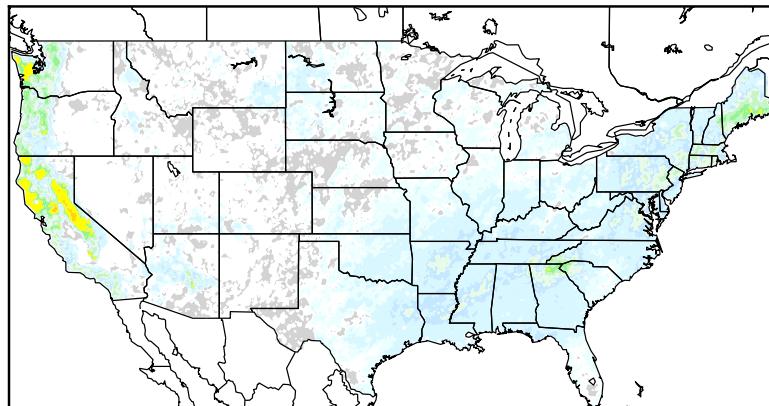
(c) Raw 11-member ensemble forecast



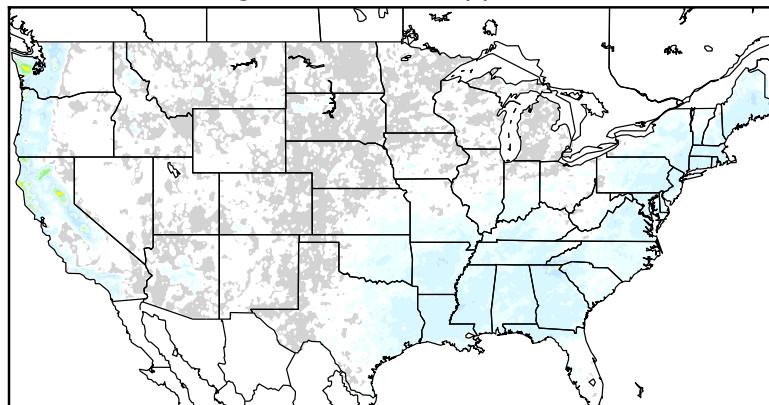
**Figure B4:** As in Fig. B3, but for 12-24 h forecasts of the > 10 mm event.

Brier Skill Scores for 012 to 024-h forecasts, > 25mm event

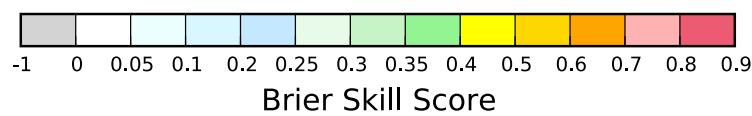
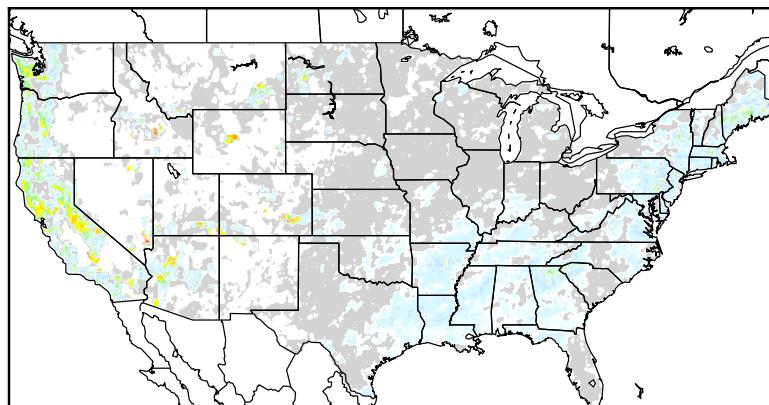
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



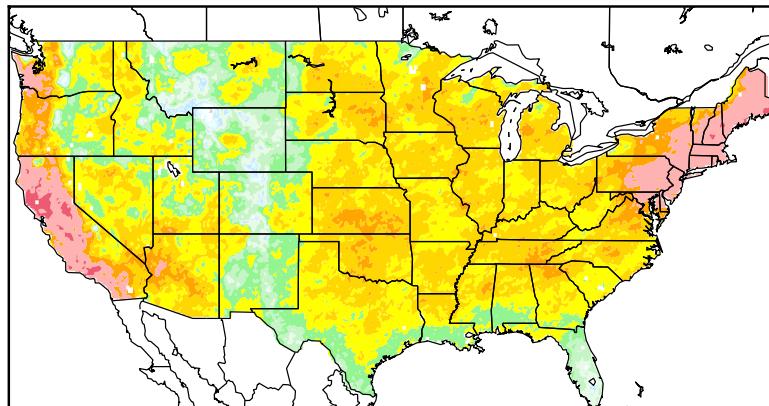
(c) Raw 11-member ensemble forecast



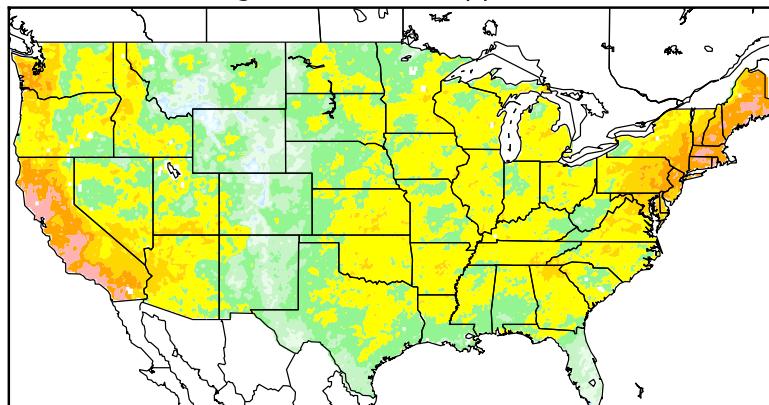
**Figure B5:** As in Fig. B3, but for 12-24 h forecasts of the > 25 mm event.

Brier Skill Scores for 012 to 024-h forecasts, > q95 event

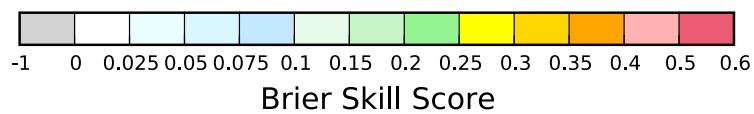
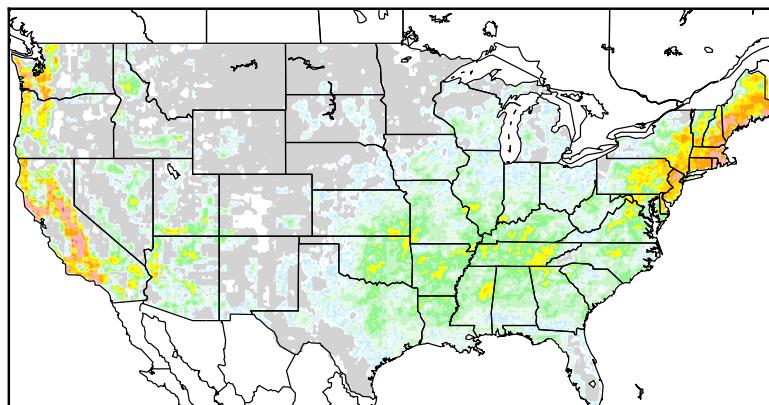
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



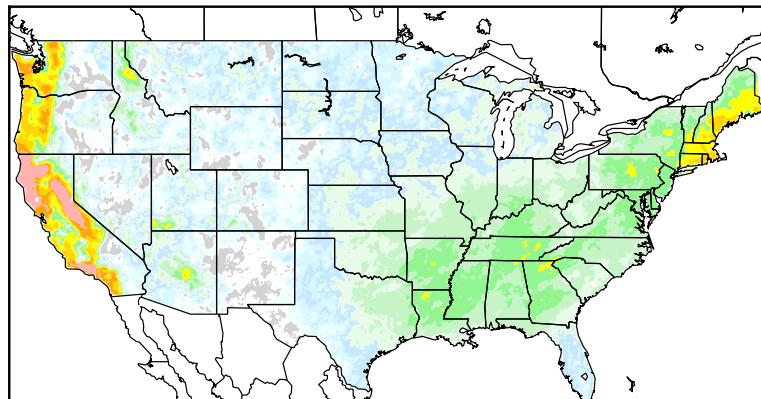
(c) Raw 11-member ensemble forecast



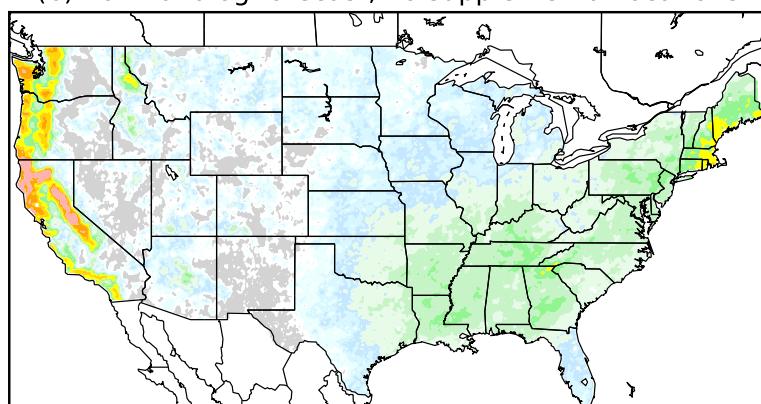
**Figure B6:** As in Fig. B3, but for 12-24 h forecasts of the > q95 event.

Brier Skill Scores for 060 to 072-h forecasts, > 10mm event

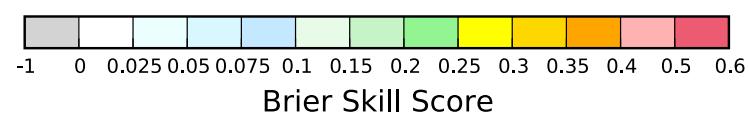
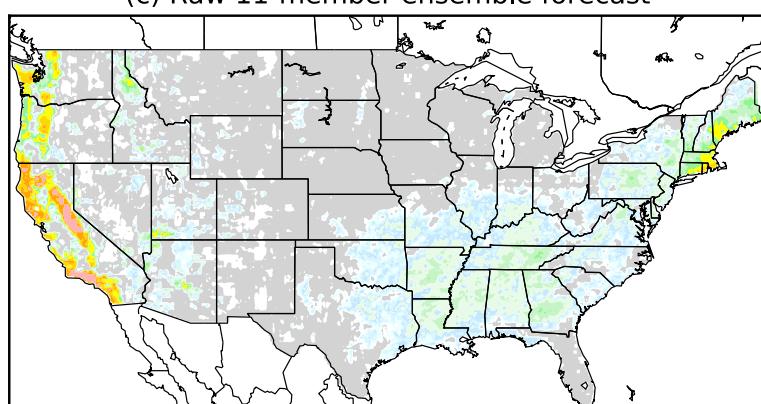
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



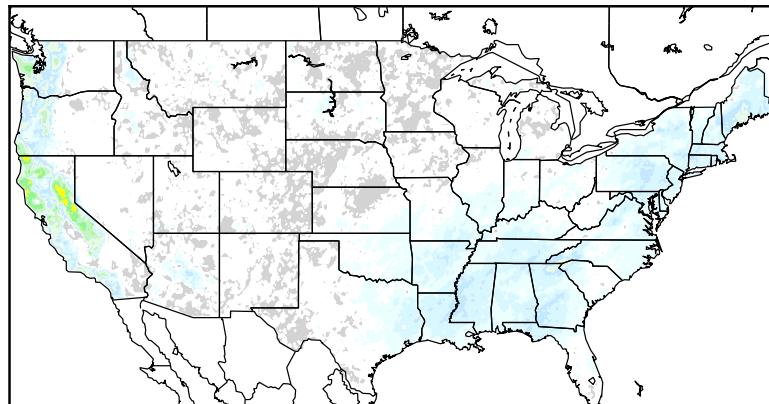
(c) Raw 11-member ensemble forecast



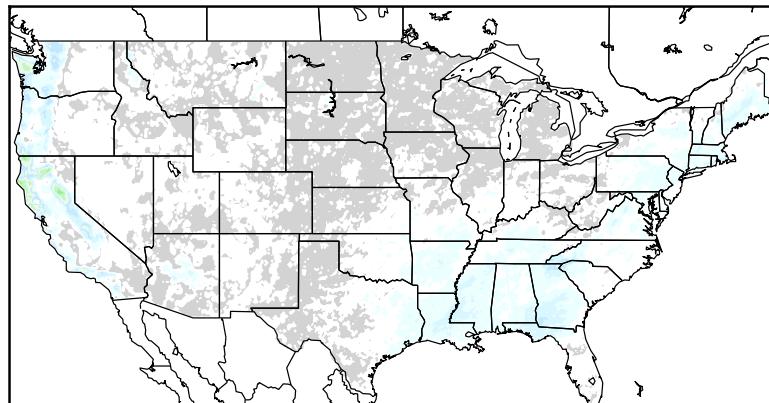
**Figure B7:** As in Fig. B3, but for 60-72 h forecasts of the > 10 mm event.

Brier Skill Scores for 060 to 072-h forecasts, > 25mm event

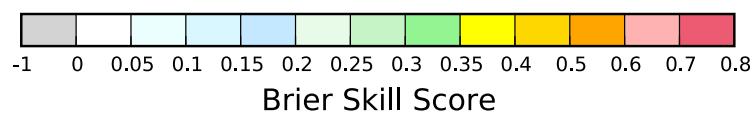
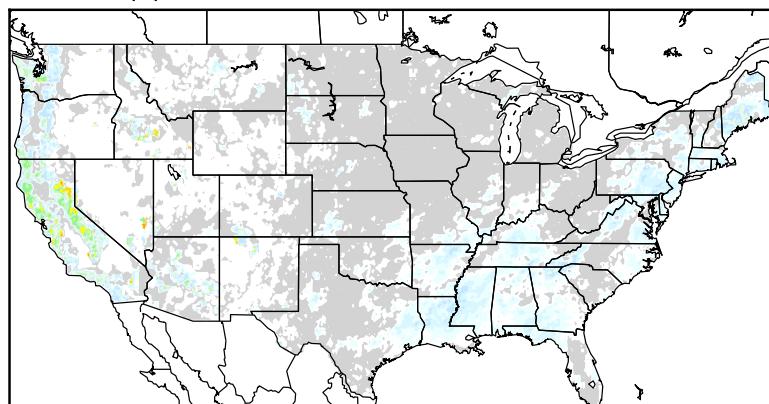
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations

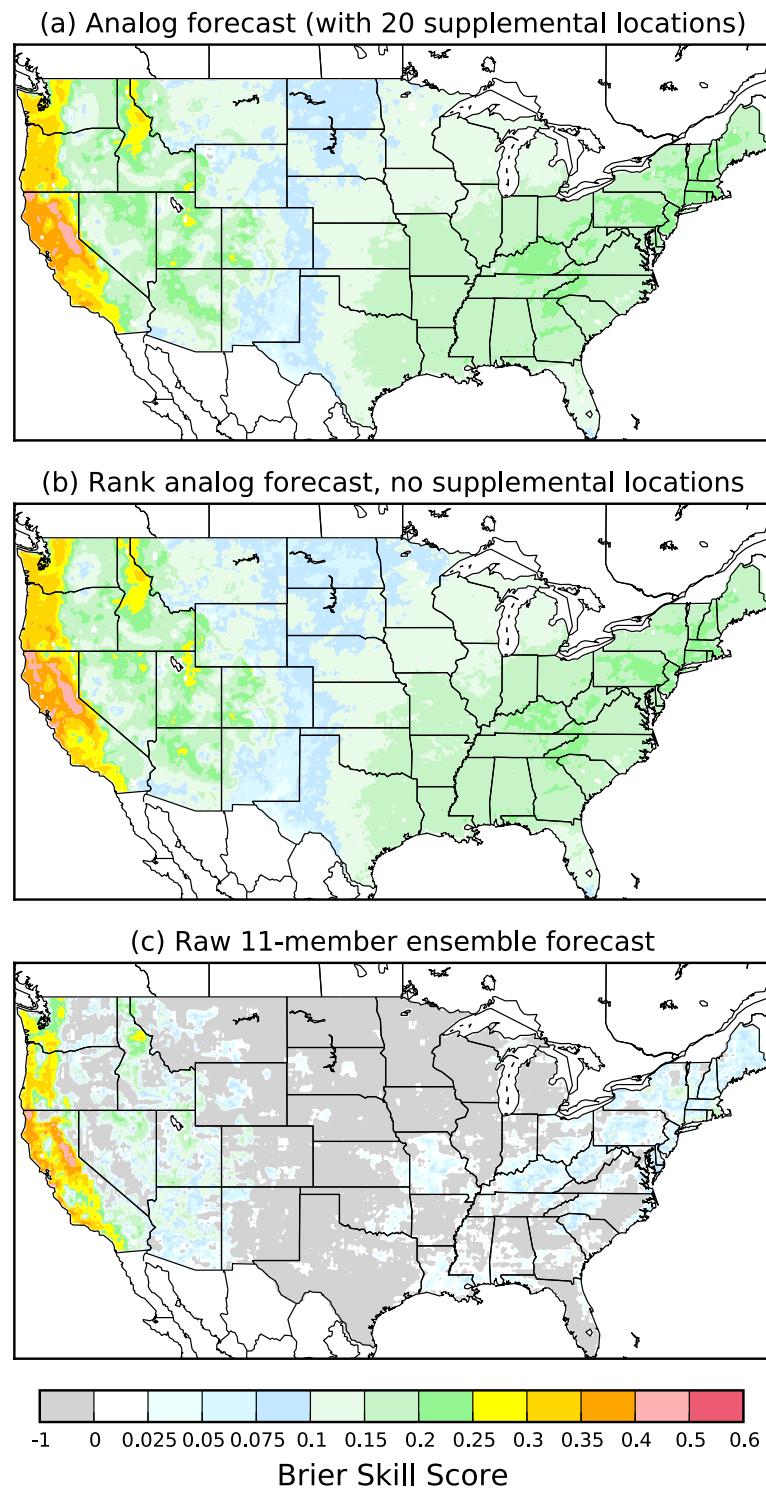


(c) Raw 11-member ensemble forecast



**Figure B8:** As in Fig. B3, but for 60-72 h forecasts of the > 25 mm event.

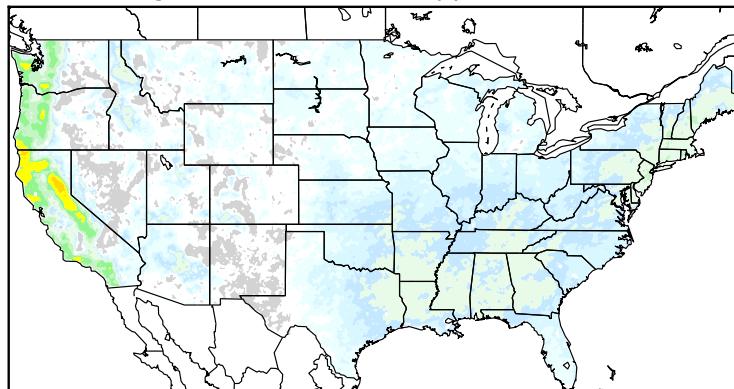
Brier Skill Scores for 108 to 120-h forecasts, > 1mm event



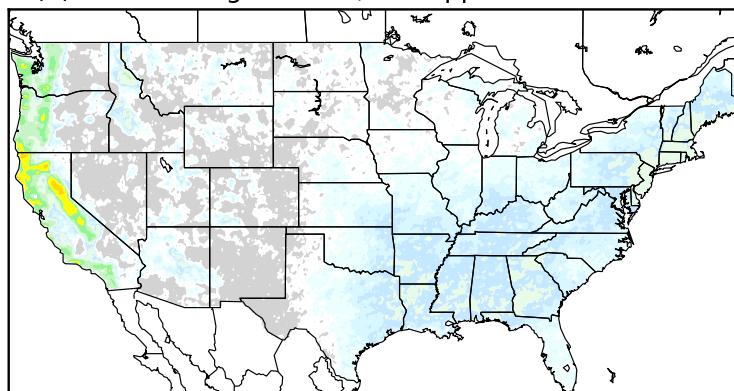
**Figure B9:** As in Fig. B3, but for 108-120 h forecasts of the > 1 mm event.

Brier Skill Scores for 108 to 120-h forecasts, > 10mm event

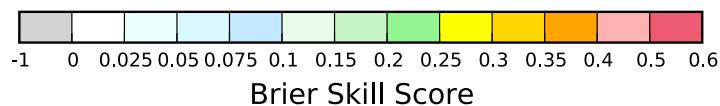
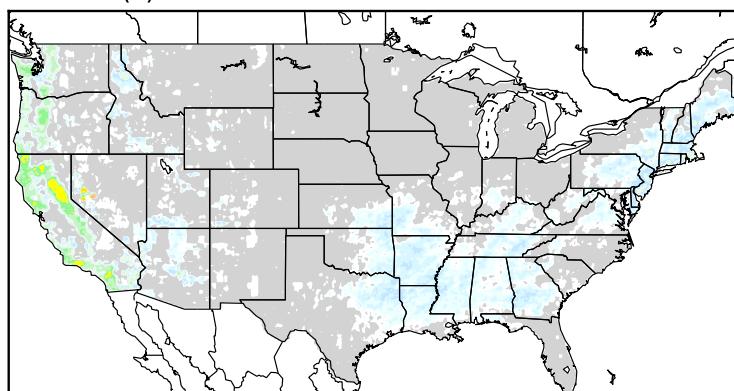
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



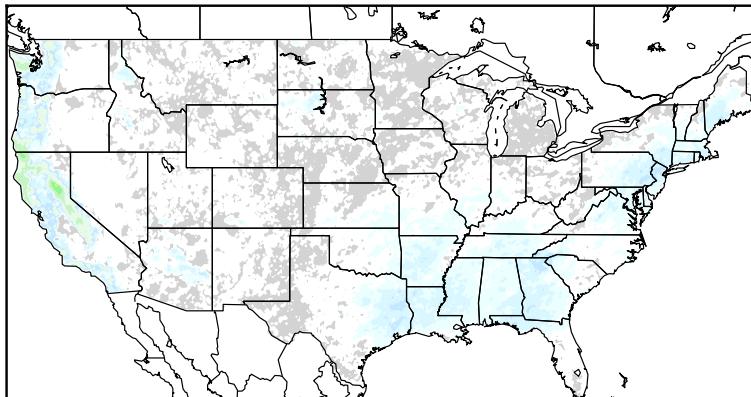
(c) Raw 11-member ensemble forecast



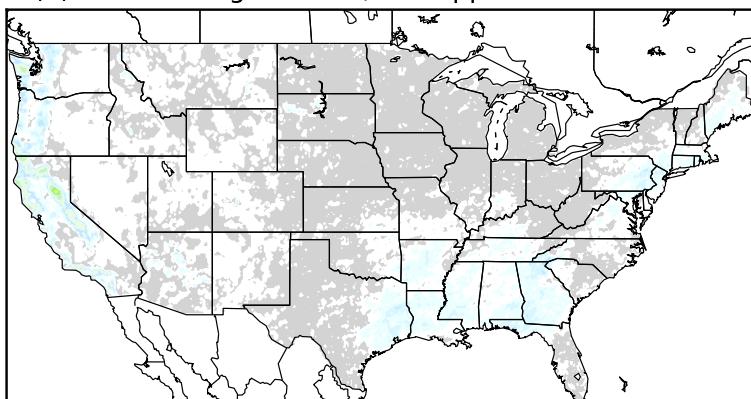
**Figure B10:** As in Fig. B3, but for 108-120 h forecasts of the > 10 mm event.

Brier Skill Scores for 108 to 120-h forecasts, > 25mm event

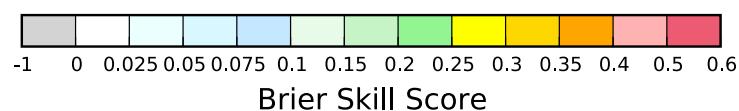
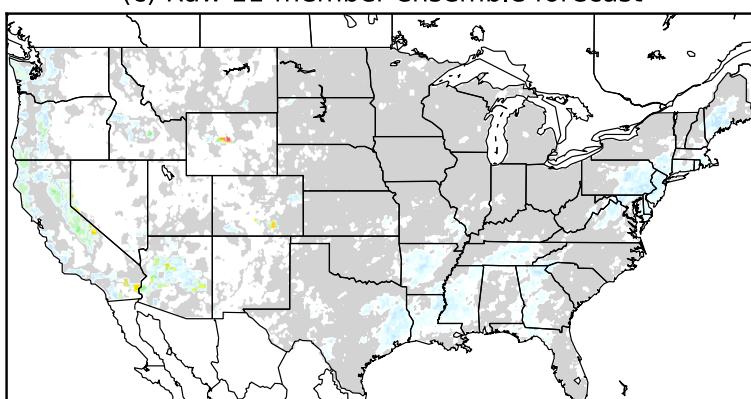
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



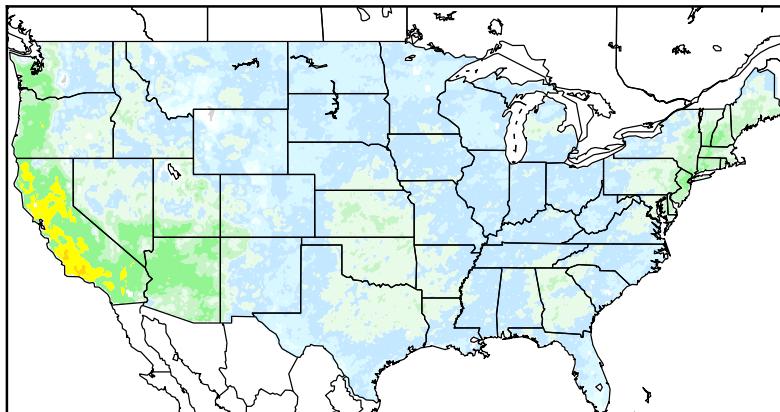
(c) Raw 11-member ensemble forecast



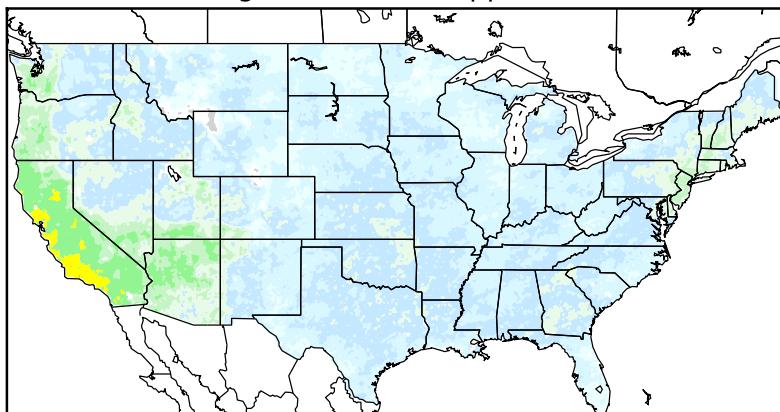
**Figure B11:** As in Fig. B3, but for 108-120 h forecasts of the > 25 mm event.

Brier Skill Scores for 108 to 120-h forecasts, > q95 event

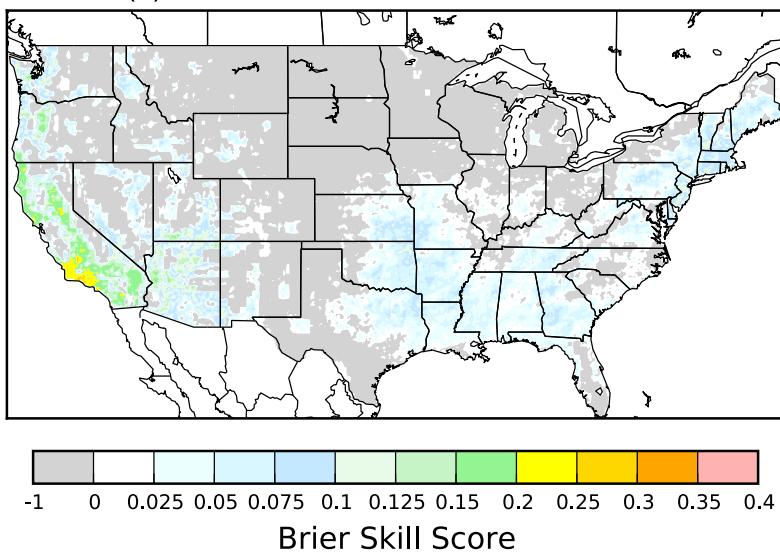
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations

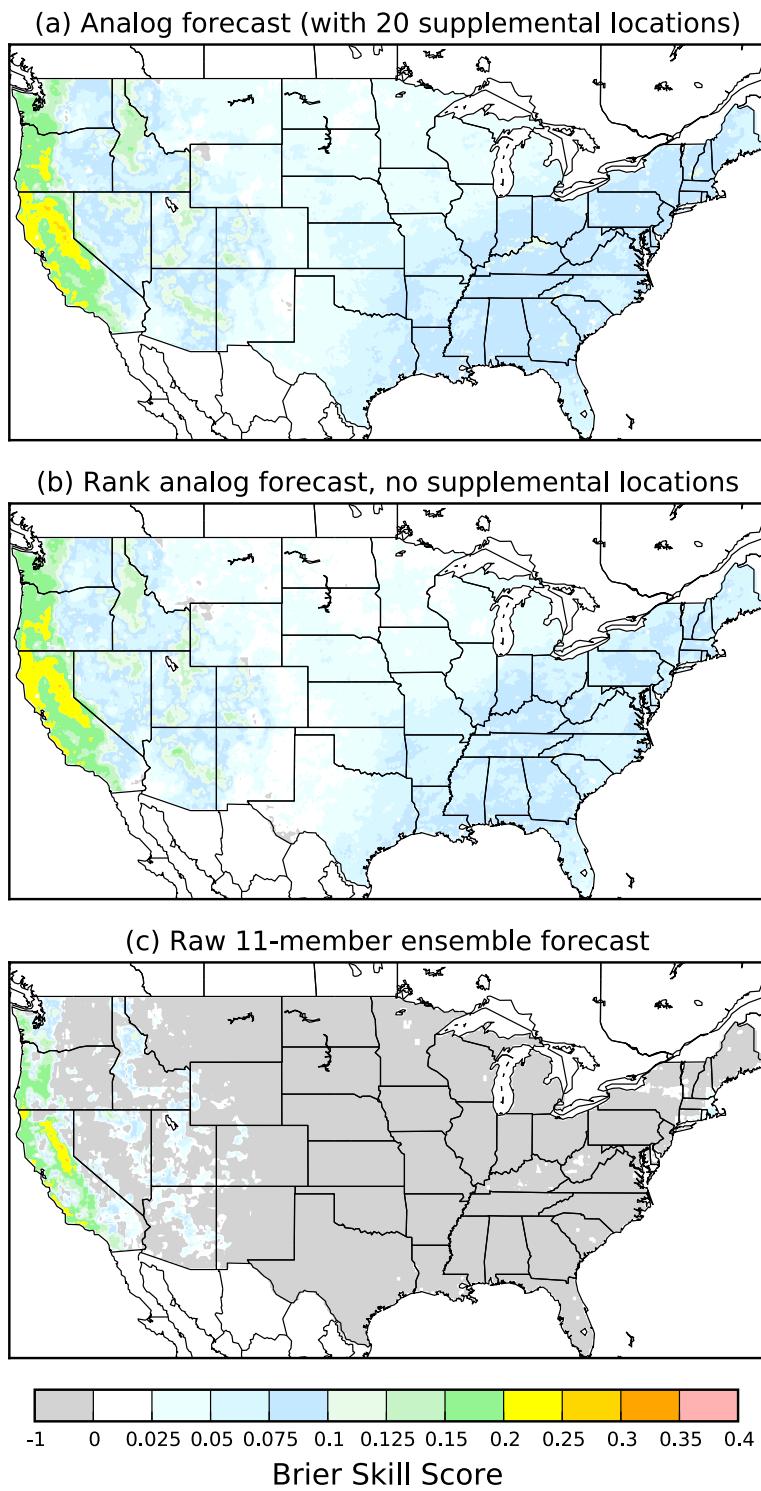


(c) Raw 11-member ensemble forecast



**Figure B12:** As in Fig. B3, but for 108-120 h forecasts of the > q95 event.

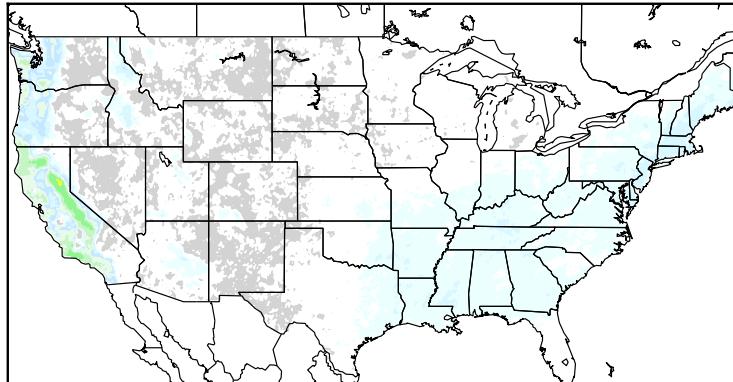
Brier Skill Scores for 156 to 168-h forecasts, > 1mm event



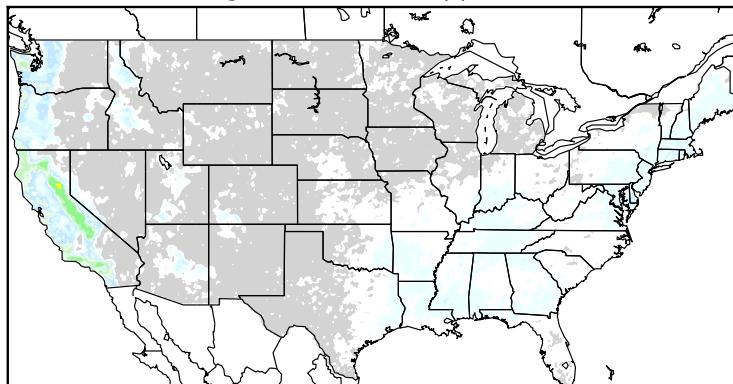
**Figure B13:** As in Fig. B3, but for 156-168 h forecasts of the > 1 mm event.

Brier Skill Scores for 156 to 168-h forecasts, > 10mm event

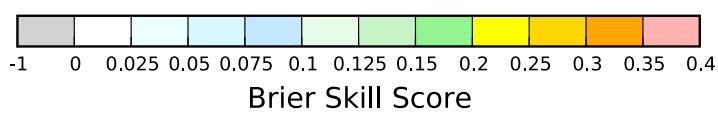
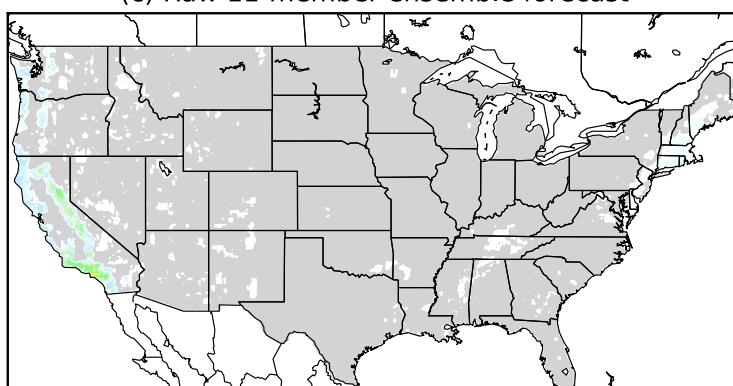
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



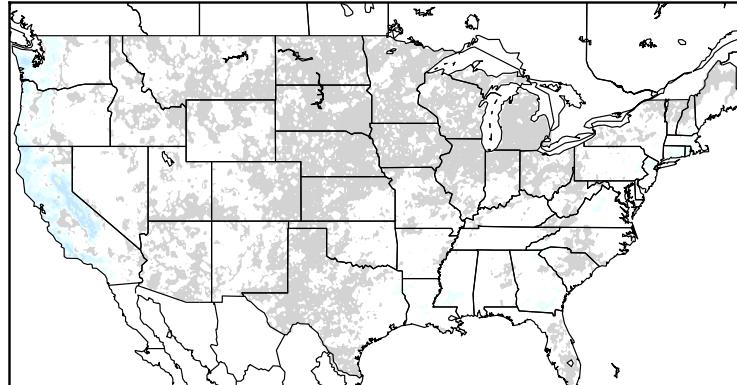
(c) Raw 11-member ensemble forecast



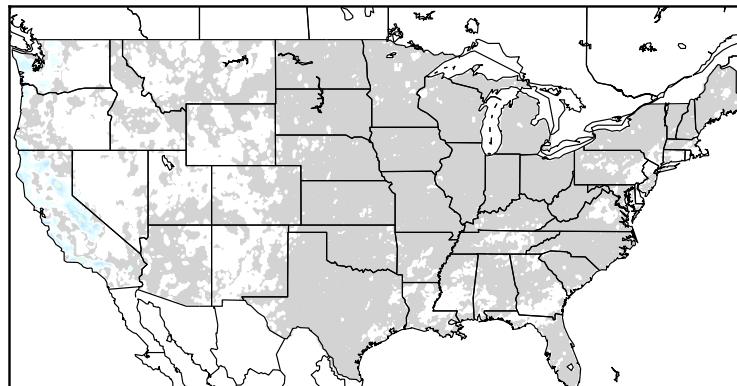
**Figure B14:** As in Fig. B3, but for 156-168 h forecasts of the > 10 mm event.

Brier Skill Scores for 156 to 168-h forecasts, > 25mm event

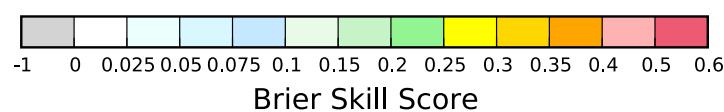
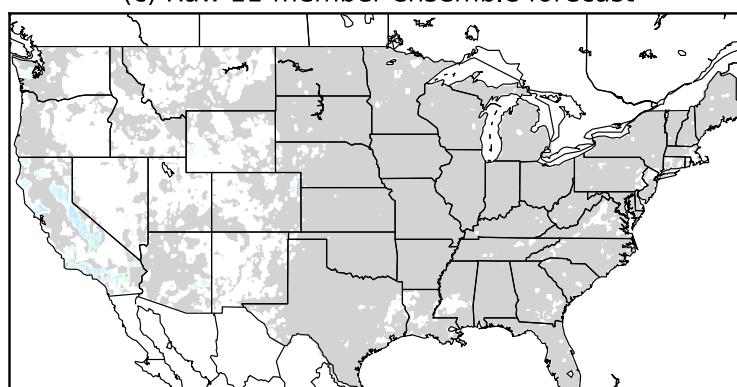
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations



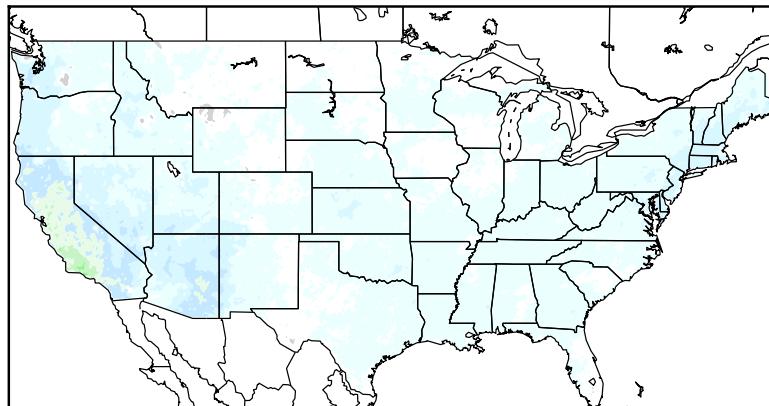
(c) Raw 11-member ensemble forecast



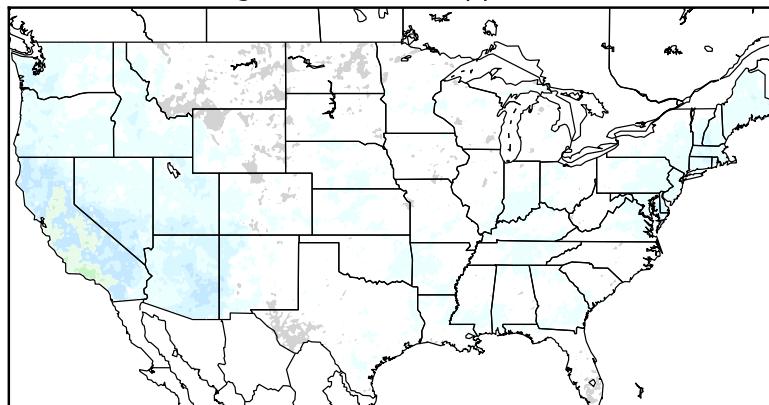
**Figure B15:** As in Fig. B3, but for 156-168 h forecasts of the > 25 mm event.

Brier Skill Scores for 156 to 168-h forecasts, > q95 event

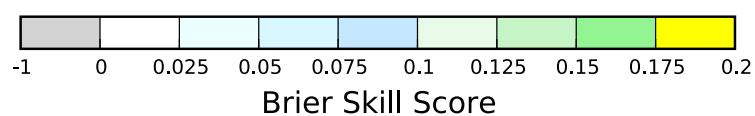
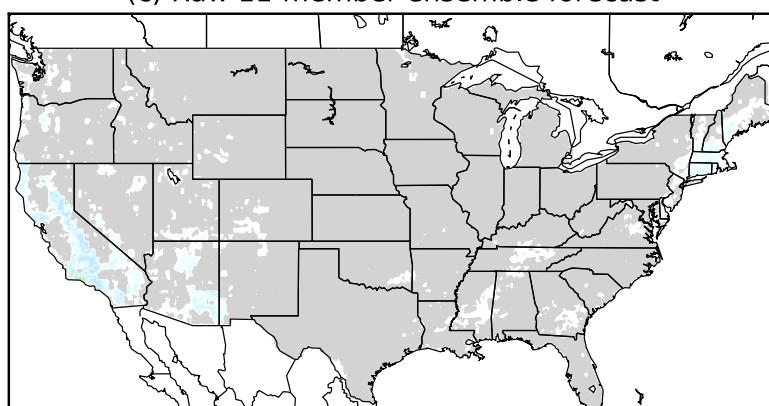
(a) Analog forecast (with 20 supplemental locations)



(b) Rank analog forecast, no supplemental locations

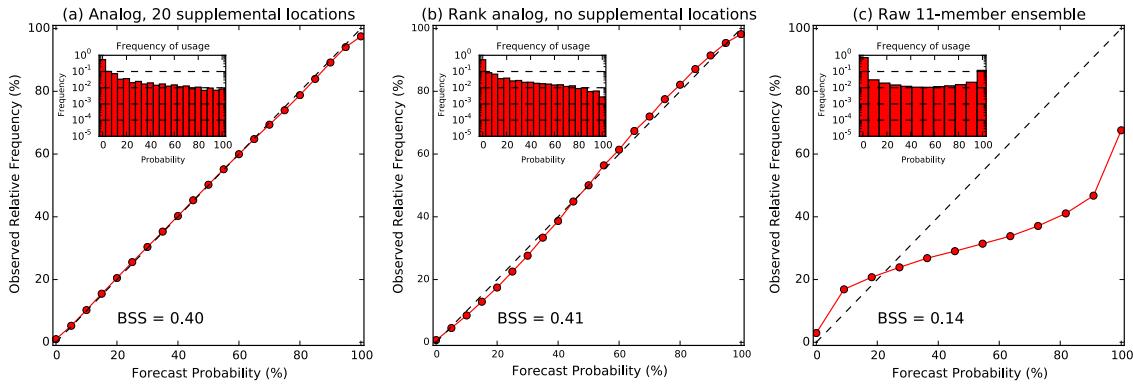


(c) Raw 11-member ensemble forecast



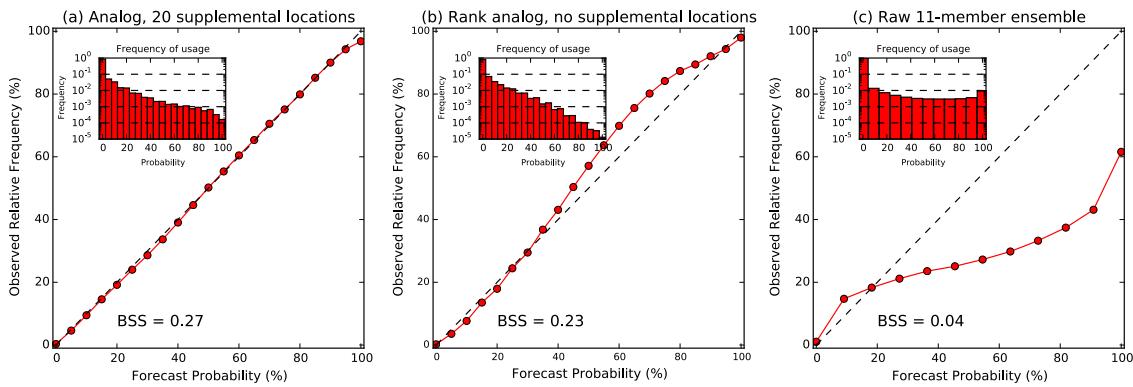
**Figure B16:** As in Fig. B3, but for 156-168 h forecasts of the > q95 event.

### Reliability for 012-024-h, > 1mm



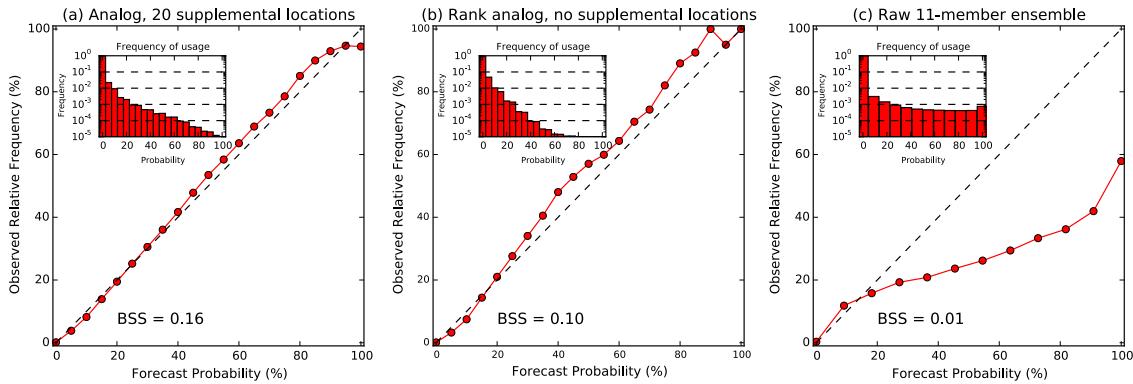
**Figure B17:** Reliability diagrams as in Fig. 6 from the article, but for 12-24 h forecasts of the > 1 mm event.

### Reliability for 012-024-h, > 10mm



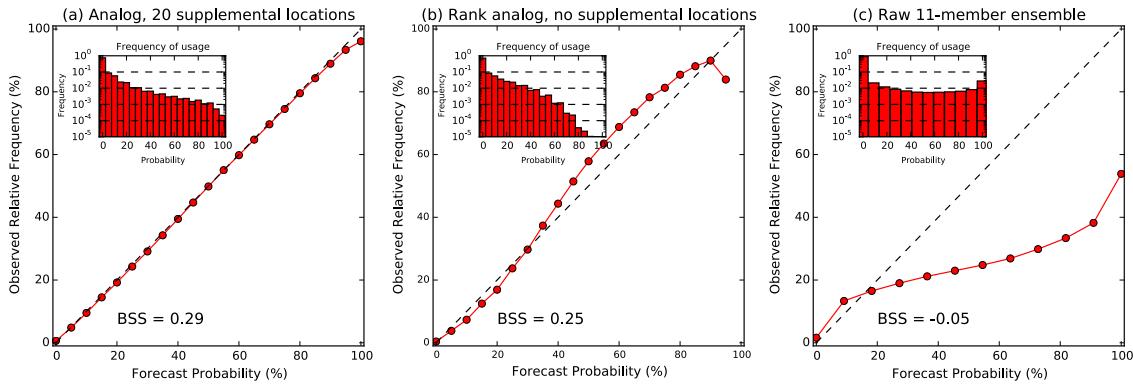
**Figure B18:** As in Fig. B17, but for 12-24 h forecasts of the > 10 mm event.

### Reliability for 012-024-h, > 25mm



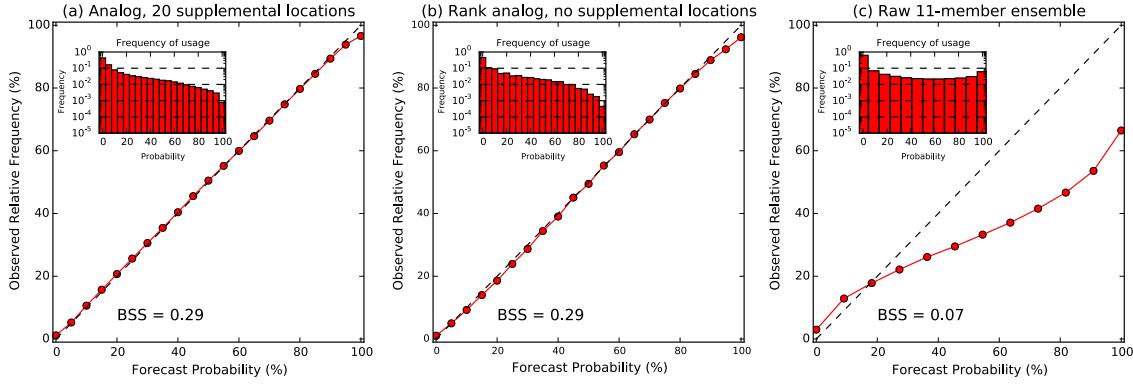
**Figure B19:** As in Fig. B17, but for 12-24 h forecasts of the > 25 mm event.

### Reliability for 012-024-h, > q95



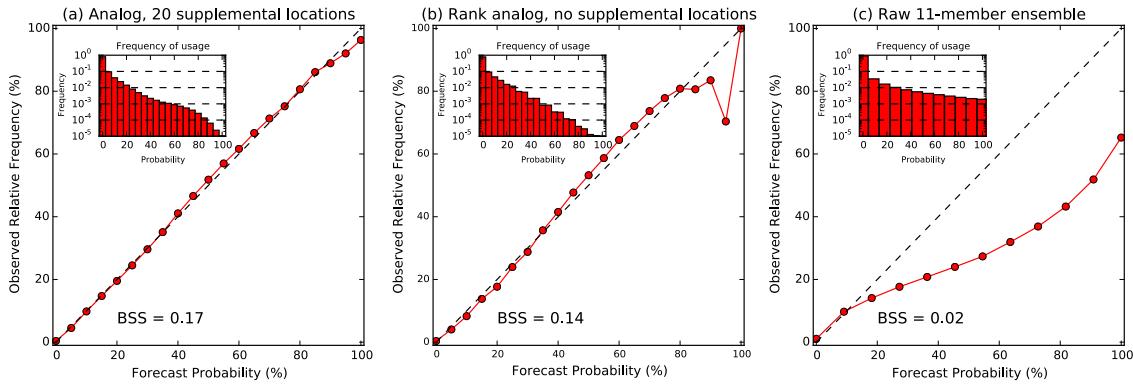
**Figure B20:** As in Fig. B17, but for 12-24 h forecasts of the > q95 event.

### Reliability for 060-072-h, > 1mm



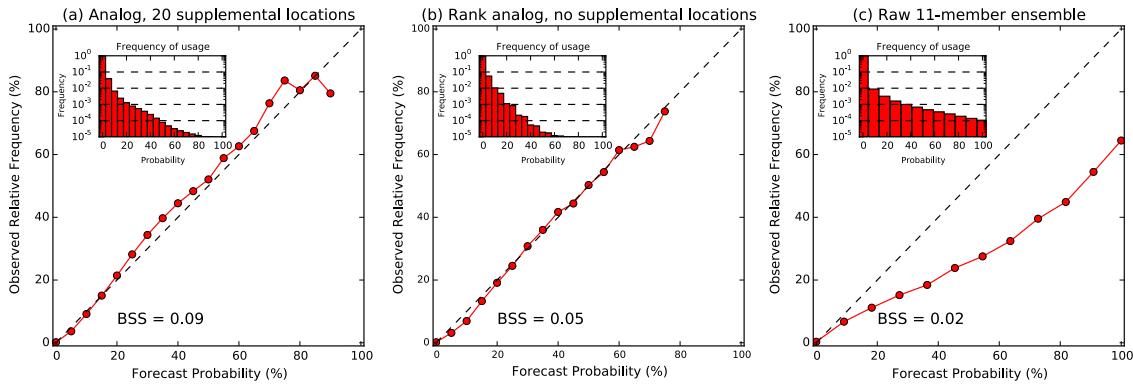
**Figure B21:** As in Fig. B17, but for 60-72 h forecasts of the > 1 mm event.

### Reliability for 060-072-h, > 10mm



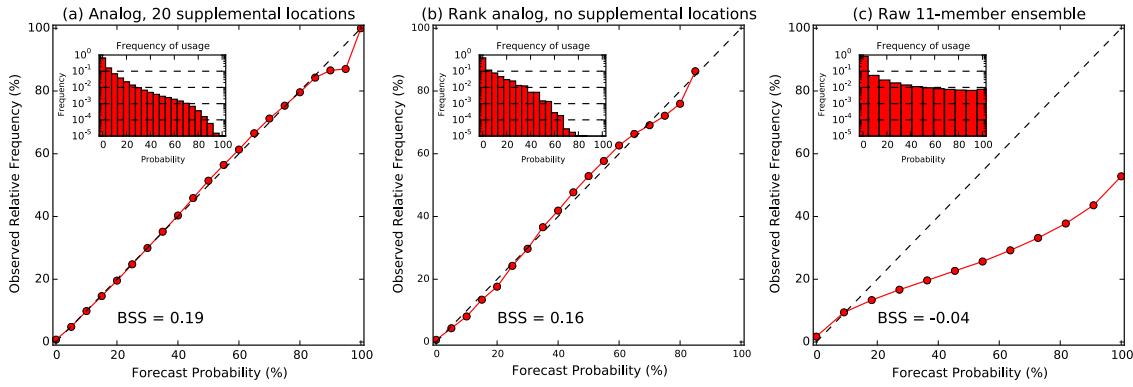
**Figure B22:** As in Fig. B17, but for 60-72 h forecasts of the > 10 mm event.

### Reliability for 060-072-h, > 25mm



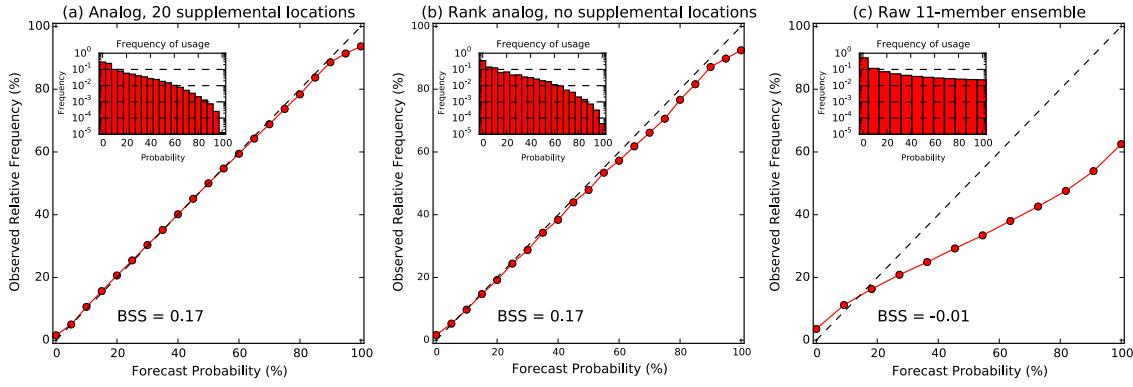
**Figure B23:** As in Fig. B17, but for 60-72 h forecasts of the > 25 mm event.

### Reliability for 060-072-h, > q95



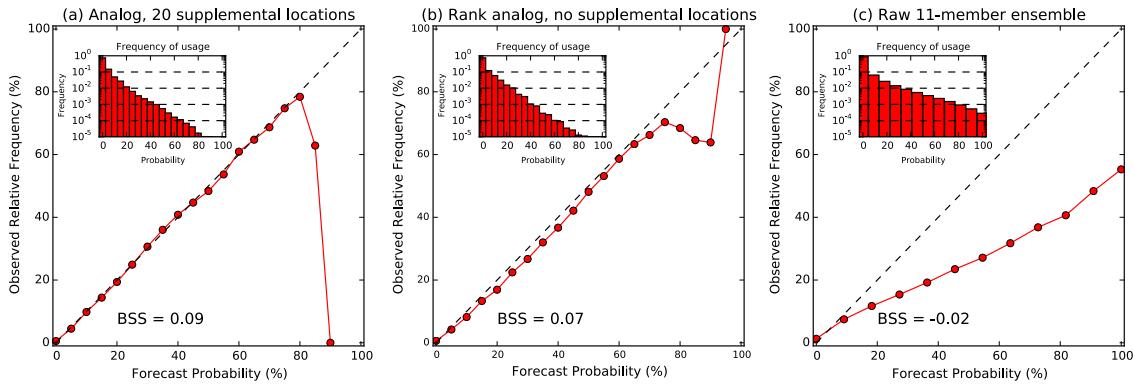
**Figure B24:** As in Fig. B17, but for 60-72 h forecasts of the > q95 event.

### Reliability for 108-120-h, > 1mm



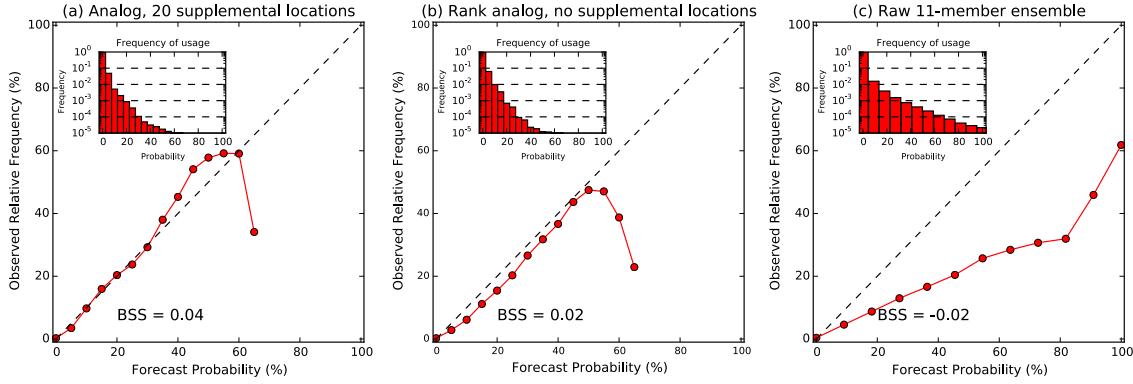
**Figure B25:** As in Fig. B17, but for 108-120 h forecasts of the > 1 mm event.

### Reliability for 108-120-h, > 10mm



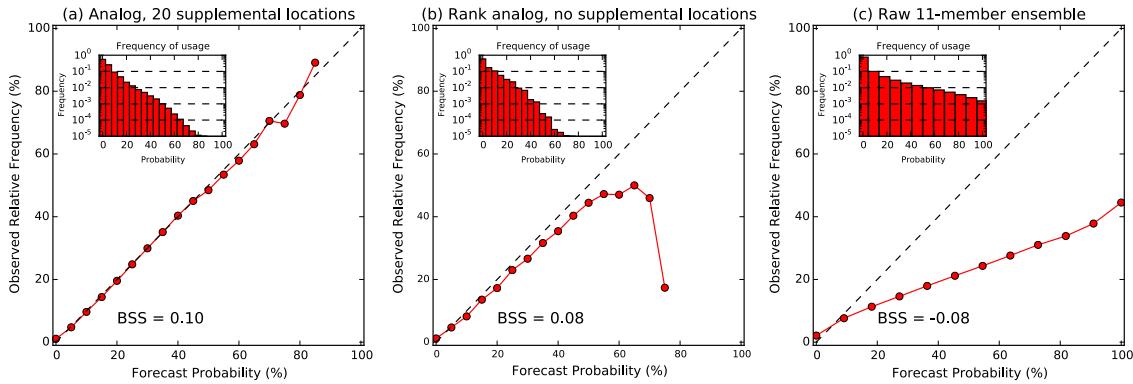
**Figure B26:** As in Fig. B17, but for 108-120 h forecasts of the > 10 mm event.

### Reliability for 108-120-h, > 25mm



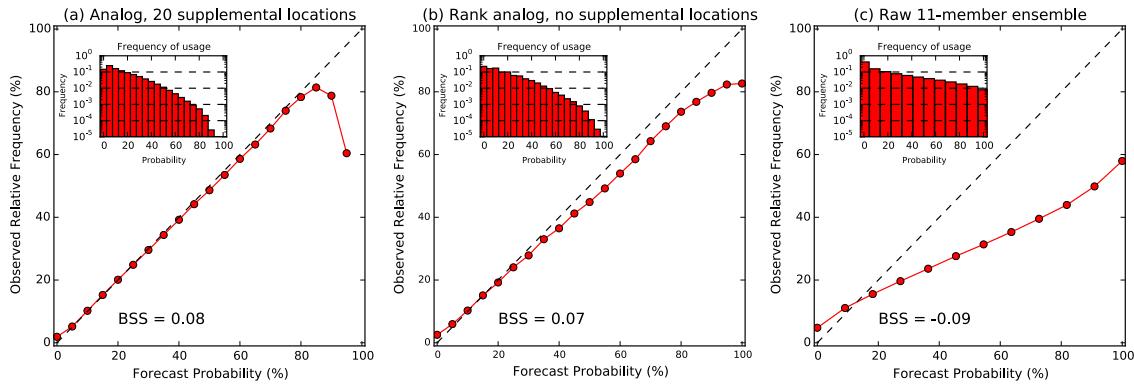
**Figure B26:** As in Fig. B17, but for 108-120 h forecasts of the > 25 mm event.

### Reliability for 108-120-h, > q95



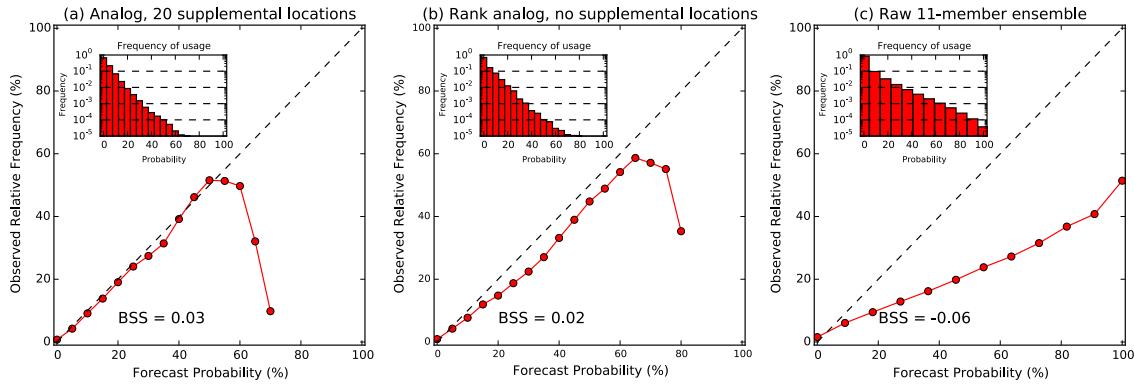
**Figure B27:** As in Fig. B17, but for 108-120 h forecasts of the > q95 event.

### Reliability for 156-168-h, > 1mm



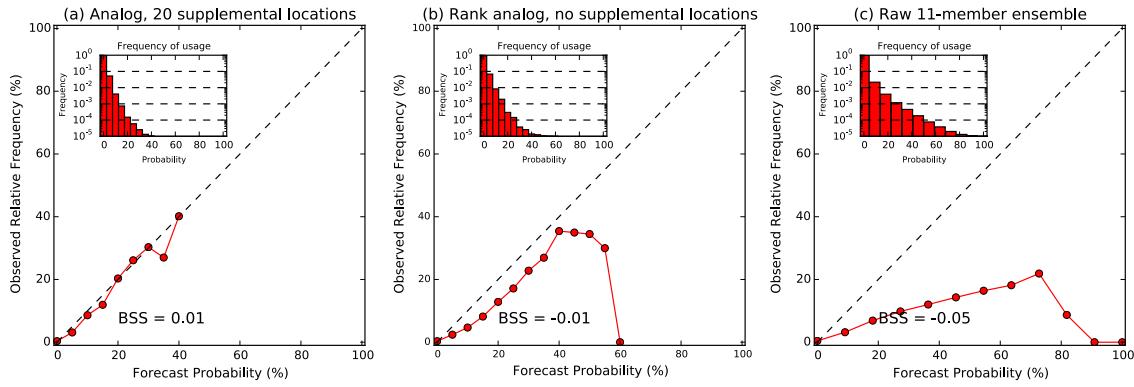
**Figure B28:** As in Fig. B17, but for 156-168 h forecasts of the > 1 mm event.

### Reliability for 156-168-h, > 10mm



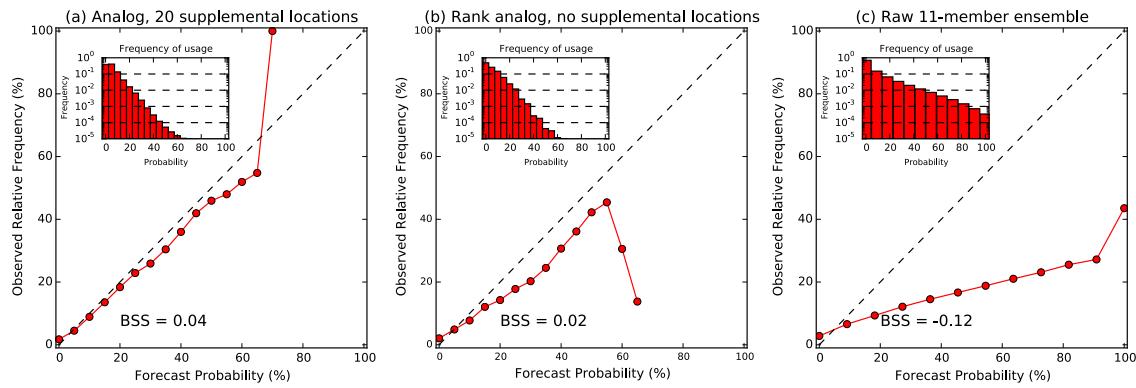
**Figure B29:** As in Fig. B17, but for 156-168 h forecasts of the > 10 mm event.

### Reliability for 156-168-h, > 25mm



**Figure B29:** As in Fig. B17, but for 156-168 h forecasts of the > 25 mm event.

### Reliability for 156-168-h, > q95



**Figure B30:** As in Fig. B17, but for 156-168 h forecasts of the > q95 event.